

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-40

Name: Newell Lake

County: Butte

Legal description: T 10N, R 6E Sec. 9

Location from nearest town: 8 miles north and 2 miles east of Newell, SD

Dates of present survey: June 25-27, October 3, 2007

Date last surveyed: May 30-June 1; October 27, 2006

Most recent lake management plan: F21-R-36

Date: 1997

Management classification: Warm-water permanent

Contour mapped: 1991

Primary Species: (game and forage)

1. Largemouth bass
2. Bluegill
3. Northern pike
4. Yellow perch
5. Walleye

Secondary and other species:

1. Smallmouth bass
2. Rudd
3. White sucker
4. Black bullhead
5. _____

PHYSICAL CHARACTERISTICS

Surface Area: 183 acres, 74 ha;

Watershed: 7,680 acres

Maximum depth: 32 feet;

Mean depth: 13.6 feet

Lake elevation at survey (from known benchmark): -4 feet

1. Describe ownership of lake and adjacent lakeshore property:

The Department of Game, Fish and Parks own Newell Lake, as well as the surrounding property. The shoreline is managed as a recreation area and a game production area.

2. Describe watershed condition and percentages of land use:

The Newell Lake watershed is approximately 12 square miles of pasture land. The area has been negatively affected by the recent drought and heavy cattle grazing.

3. Describe aquatic vegetative condition:

Submerged aquatic vegetation in Newell Lake consists of coontail and cattail. Summer months are often characterized as having large amounts of vegetation in the shallow bays and inlets. Emergent vegetation consists of bulrush and cattail.

4. Describe pollution problems:

Siltation occurs in the inlet area and is the primary problem in the lake. Sloughing of banks caused by cattle grazing and cattle excretions within the game production area are other pollution issues.

5. Describe condition of all structures, i.e. spillway, level regulators, boat ramps, etc.:

In 1998, following the lake survey, major damage occurred to the tubes that required rebuilding the spillway. Work on the spillway was completed in 1999. The spillway and dam is currently in good condition. At the time of the survey, low water made the boat ramp barely useable.

BIOLOGICAL DATA

Methods

A lake survey was conducted at Newell June 25-27, 2007. Sampling consisted of 2 gill net nights and 8 trap net nights (Appendix C). All gill nets were monofilament experimental nets. Each net was 45.7 m (150 ft) long and 1.8 m (6 ft) deep with six 7.6 m (25 ft) panels of bar mesh sizes: 12.7 mm (0.5 in), 19.1 mm (0.75 in), 25.4 mm (1.0 in), 31.8 mm (1.25 in), 38.1 mm (1.5 in), and 50.8 mm (2.0 in). Trap nets were set at four stations consisting of 2 trap net nights each. All trap nets were modified fyke-nets with a 1.3 X 1.5 m frame, 19.1 mm (0.75 in) mesh and a 1.2 X 23 m (3.9 X 75.5 ft) lead. Collected fish were measured for total length (TL; mm) and weighed (g). In addition, scale samples for the first five fish per centimeter group were collected from selected fish per gear type for age and growth analysis. Scale samples were pressed onto acetate slides and viewed with a microfiche projector (40X) and the distance between scale annuli were recorded on paper strips. All data was entered into WinFin 2.95 (Francis 1999).

Night electrofishing was conducted at Newell on October 3, 2007. Electrofishing was conducted using a Smith-Root control unit with pulsed-DC. Six 10-minute sampling runs were completed during the survey. All largemouth bass were collected, measured for total length (TL; mm) and weighed (g). In addition, scale samples were collected from up to 5 fish per centimeter group for largemouth bass for age and growth analysis. All data was entered into WinFin 2.95.

Fish population parameters, confidence intervals and standard errors were computed using WinFin Analysis (Francis 2000). Parameters calculated were catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr) based on length categories. Abundance was expressed as the mean catch per unit effort (CPUE; mean number per net night or mean number per hour of electrofishing). Actual pedal time (time the electrofishing unit produced current) was recorded from the digital display on the Smith-Root control box and used to calculate electrofishing CPUE. Population structural characteristics were expressed as length frequency histograms and stock density indices (PSD and RSD-P). Fish condition was expressed as mean Wr.

Results and Discussion

Fish Community Surveys

Overall, 7 fish species were collected during the lake survey conducted June 25-26, 2007 (Tables 1 and 2). Seventy-two fish were collected by the gill nets, with yellow perch being the most abundant. A total of 620 fish were collected in frame nets, with bluegill comprising 65.2%, and rudd comprising 21.0% of the sample. Fall electrofishing on October 3, 2007 yielded 69 largemouth bass and 69 walleye. Population parameters of dominant game and forage species in Newell Lake are discussed individually below.

Table 1. Total catch (N), catch per net night (CPUE; 80% CI's in parentheses), catch per net night of stock length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses), and condition factor (Wr for fish \geq stock-length; 80%CI's) for all fish species collected from seven $\frac{3}{4}$ inch trapnets in Newell Lake, Butte County, June 25-27, 2007.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr \geq S
Bluegill	404	57.7 (12.3)	57.7 (12.3)	53 (5)	9 (3)	100.6 (0.7)
Northern pike	1	0.1 (0.2)	0.1 (0.2)	--	--	78.6 (--)
European rudd	130	18.6 (6.4)	--	--	--	--
Smallmouth bass	1	0.1 (0.2)	0.1 (0.2)	--	--	101.7 (--)
Walleye	18	2.6 (1.3)	2.4 (1.3)	18 (17)	0 (--)	85.4 (5.3)
White sucker	65	9.3 (4.0)	9.3 (4.0)	100 (--)	100 (--)	86.0 (1.0)
Yellow perch	1	0.1 (0.2)	0.1 (0.2)	--	--	81.9 (0.0)
Total	620					

Table 2. Total catch (N), catch per net night (CPUE; 80% CI's in parentheses), catch per net night of stock length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses), and condition factor (Wr for fish \geq stock-length; 80%CI's) for all fish collected from two 150-ft experimental sinking gill nets in Newell lake, June 25-27, 2007.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr \geq S
Northern pike	9	4.5 (1.5)	4.5 (1.5)	0 (--)	0 (--)	82.3 (5.8)
Rudd	4	2.0 (0.0)	2.0 (0.0)	--	--	--
Walleye	4	2.0 (3.1)	2.0 (3.1)	--	--	81.5 (7.8)
White sucker	5	2.5 (4.6)	2.5 (4.6)	--	--	93.5 (4.6)
Yellow perch	50	25.0 (77.0)	0.0 (--)	0 (--)	0 (--)	--
Total	72					

Table 3. Total catch (N), fish per hour (CPUE; 80% CI's in parentheses), fish per hour of stock length fish (CPUE-S; 80%CI's), proportional stock densities (PSD, RSD-P; 90% CI's in parentheses), and condition factor (Wr for fish \geq stock length; 80%CI's) for largemouth bass and walleye collected from 60.8 minutes of electrofishing at Newell, Butte County, October 3, 2007.

Species	N	CPUE	CPUE-S	PSD	RSD-P	Wr \geq S
Largemouth bass	69	67.9 (15.8)	55.2 (15.1)	73 (10)	23 (10)	117.2 (1.3)
Walleye	69	67.1 (22.1)	23.9 (17.0)	32 (16)	4 (7)	96.1 (1.6)
Total	138					

Bluegill

Bluegill were the most abundant panfish in Newell with a frame net CPUE of 57.7 (Table 4). Stock indices yielded a PSD of 53 with an RSD-P of 9. These numbers suggest Newell should provide an excellent bluegill fishery. These numbers also fit right in the current management objective for bluegill with PSD between 50 and 80 and RSD-P between 10 and 30. In 2006, CPUE was 17.5 with a PSD of 57 and an RSD-P of 11. Fish condition of adult bluegill remains excellent with a mean Wr for stock-length and larger fish of 100.6, similar to the mean Wr in 2006 at 102.2. Bluegill growth was calculated last year and was slower than the state mean but fish up to 8 years old were sampled.

Table 4. Composite listing of sample size (N), catch per unit effort (CPUE; 80% confidence intervals are given in parentheses), proportional stock densities (PSD, RSD; 90% CI's in parentheses) and fish condition for fish larger than stock-length (Wr>S; 90% CI's in parentheses) for bluegill collected by trap nets in Newell Lake, 2002, 2004, 2006, 2007.

Year	N	CPUE-S	PSD	RSD-P	Wr>Stock
2002	192	24.0 (9.7)	76 (5)	16 (5)	92.1 (1.0)
2004	231	33.0 (8.8)	76 (5)	4 (2)	105.3 (0.9)
2006	140	17.5 (8.3)	57 (7)	11 (5)	102.2 (0.6)
2007	404	57.7 (12.3)	53 (5)	9 (3)	100.6 (0.7)

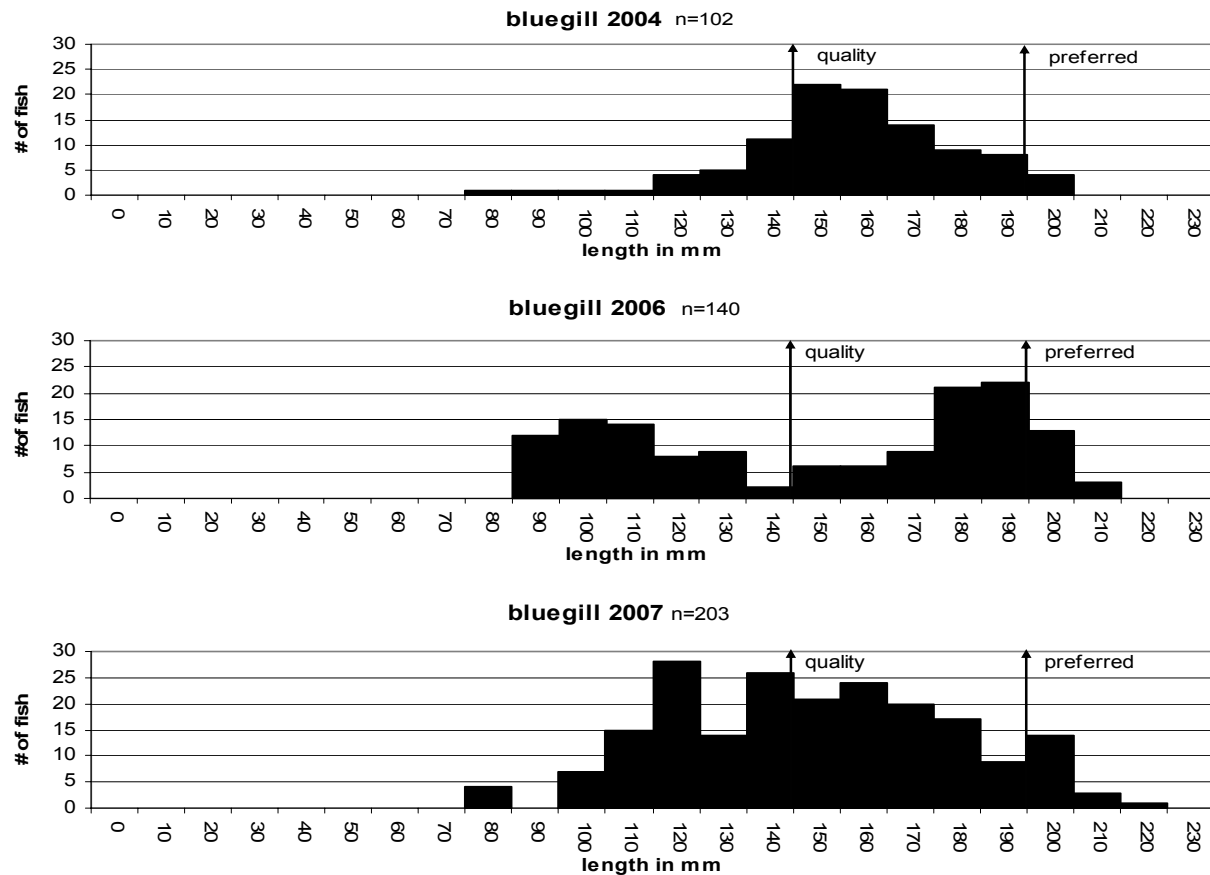


Figure 1. Lengths of bluegill collected by frame nets in Newell Lake, 2004-2007.

European Rudd

Newell's European rudd population is doing well and has changed little over the last few years. Catch per net during 2007 was 18 (Table 5). Size structure of the rudd population remains relatively the same as observed in during past surveys (Figure 2). Either recruitment is being limited or our gear is adapted to catch fish in the 12 to 15 inch range since fish sampled all appear to be larger fish. It may be that these are spawning fish and only the adult fish are captured in our gear. Hopefully, increased management efforts on predator densities will keep rudd densities in check.

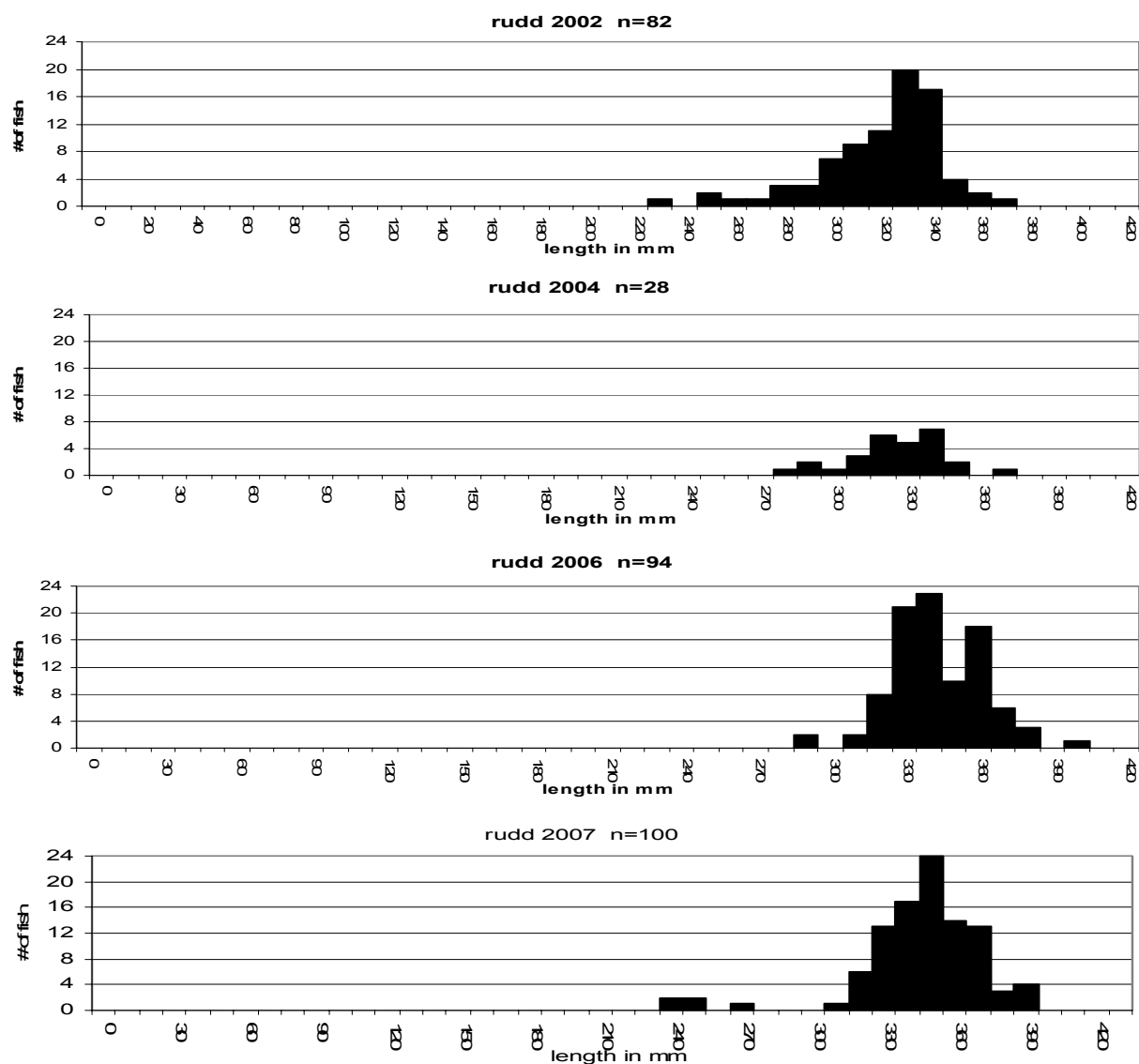


Figure 2. Length frequency histogram of rudd collected by frame nets in Newell Dam 2002-2007.

Table 5. Composite listing of sample size (N), catch per unit effort (CPUE; 80% confidence intervals are given in parentheses), for rudd collected by trap nets in Newell Lake, 2002, 2004, 2006, 2007.

Year	N	CPUE
2002	144	18.6 (6.4)
2004	53	21.6 (11.9)
2006	173	7.6 (3.4)
2007	130	18.0 (9.2)

Largemouth Bass

A 12 to 16 inch slot with a one over 16 inch regulation was put in place for 2004 to increase the numbers of larger bass. The 2007 electrofishing sample had a CPUE for stock-length and larger fish of 55.2 bass per hour, which is the highest recorded in recent history (Table 6). Stock indices were also near record levels with a PSD of 73 and an RSD-P of 23. Fish condition remained excellent with a Wr for stock-length and larger fish of 117.2 during this survey. In addition, growth was good with the average largemouth bass surpassing the state average at age-4 (Table 7).

The 2007 numbers actually exceed the current bass management objectives of a minimum CPUE for fish greater than stock length of 20; a PSD between 40 and 70; and RSD-P greater than 20. It would appear the current regulation is doing an excellent job of creating a well above average bass fishery.

Table 6. Total catch (N), pedal time (seconds), catch per hour of electrofishing (CPUE), mean total length (TL, standard error is given in parentheses), proportional stock densities (PSD, RSD; 90% confidence intervals are given in parentheses) and condition factor (Wr for fish \geq stock length; 80%CI's) for largemouth bass collected by electrofishing in Newell Lake, 2000-2007.

Year	N	Pedal Time (seconds)	CPUE	CPUE-S	PSD	RSD-P	Wr \geq S
2000	3	4,116	2.6	2.6	--	--	--
2002	125	7,200	82.2 (28)	19.2 (7)	50 (16)	0 (--)	114.6 (1.3)
2003	77	3,600	77.0 (23)	41.0 (14)	27 (12)	15 (10)	106.7 (1.3)
2004	31	3,600	31.0 (13.4)	28.0 (12.0)	36 (16)	18 (13)	108.1 (1.6)
2005	23	3,894	21.7 (9.1)	18.0 (6.0)	32 (19)	0 (--)	101.2 (1.4)
2006	36	3,800	35.5 (16.0)	30.8 (13.8)	42 (--)	16 (--)	114.3 (2.2)
2007	69	3,650	67.9 (15.8)	55.2 (15.1)	73 (10)	23 (10)	117.2 (1.3)

Table 7. Newell Lake largemouth bass age in 2007 from electrofishing, sample size (N), mean back-calculated total length at age, mean SD length at age, and population standard errors (SE) (Willis et al. 2001).

Year Class	Age	N	1	2	Age 3	4	5	6
2006	1	8	73					
2005	2	13	72	184				
2004	3	7	78	147	235			
2003	4	14	80	132	180	276		
2002	5	9	74	156	214	272	330	
2001	6	5	72	151	256	306	347	385
total		56						
2007 Mean (SE)			75 (1)	154 (8)	221(16)	284 (11)	338 (8)	385 (0)
SD Mean (SE)			96 (3)	182 (6)	250 (7)	305 (8)	342 (8)	

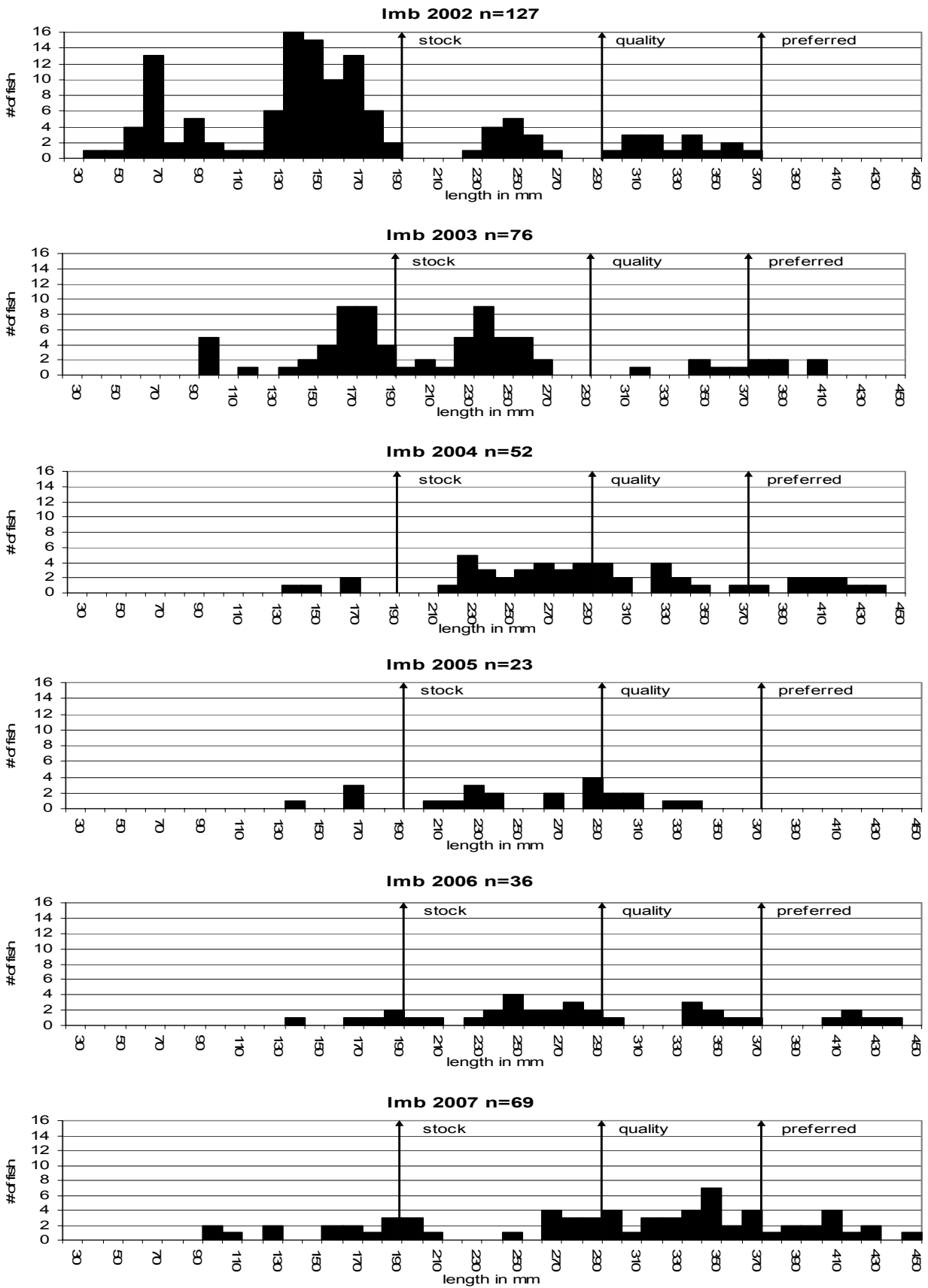


Figure 3. Length frequencies of largemouth bass collected by electrofishing in Newell Lake, Butte County, 2002-2007.

Walleye

In attempt to increase walleye density, a 14-inch minimum for walleye was placed on Newell Lake on January 1, 2004. In addition to the regulation, walleye have been stocked annually since 2003. The most recent stocking was in late spring of 2007 of fifty thousand small walleye fingerlings (Appendix A). It is hoped the increased predator abundance will provide additional predation on bluegill and rudd populations, as well as, provide a bonus walleye fishery.

Since fall electrofishing is done annually at Newell Lake to sample largemouth and smallmouth bass, the walleye population will also be monitored at this same time. During this year's electrofishing survey 69 walleyes were sampled. Of the 69 fish sample, 42 were under 200 millimeters. This indicates the largest number of age-0 fish sampled in recent years. It appears the small fingerling stocking this year have had good survival so far. Mean fish condition was 96.1 for stock length and larger fish during the fall electrofishing (Table 9). Walleye growth was just under the state average (Table 10). Electrofishing numbers have been giving a much better sample size than the gill nets and future management objectives may rely on electrofishing indices due to better indexing of the walleye population (Tables 8).

Table 8. Composite listing of catch-per-unit-effort (CPUE with 80% CI's), for walleye collected by gill nets, frame nets and fall electrofishing in Newell Lake, 2002 - 2007.

Year	Gill net	Frame net	Fall electrofishing
2002	2.0 (3.1)	1.1 (0.6)	-----
2004	6.0 (9.2)	0.1 (0.2)	11.0 (5.3)
2005	-----	-----	16.4 (7.5)
2006	0.5 (1.5)	0.4 (0.4)	26.8 (5.7)
2007	2.0 (3.1)	2.6 (1.3)	67.1 (22.1)

Table 9. Composite listing of sample size (N), catch per unit effort (CPUE; 80% confidence intervals are given in parentheses), proportional stock densities (PSD, RSD; 90% CI's in parentheses) and fish condition for fish larger than stock-length ($W_r > S$; 90% CI's in parentheses) for walleye collected by electrofishing in Newell Lake, 2004-2007.

Year	N	CPUE	CPUE-S	PSD	RSD-P	$W_r > \text{Stock}$
2004	11	11.0 (5.3)	10.0 (5.9)	80 (24)	0 (--)	84.7 (2.2)
2005	16	16.4 (7.5)	14.7 (8.1)	19 (17)	6 (11)	78.9 (1.6)
2006	29	26.8 (5.7)	24.8 (5.5)	33 (16)	4 (6)	87.9 (0.9)
2007	69	67.1 (22.1)	23.9 (17.0)	32 (16)	4 (7)	96.1 (1.6)

Table 10. Newell Lake walleye age in 2007 from electrofishing, sample size (N), mean back-calculated total length at age, mean SD length at age, and population standard errors (SE) (Willis et al. 2001).

Year Class	Age	N	1	2	Age 3	4
2006	1	6	159			
2005	2	16	181	293		
2004	3	1	167	176	347	
2003	4	3	159	255	323	409
total		26				
2007 Mean (SE)			167 (5)	275 (11)	335 (12)	409 (0)
SD Mean (SE)			168 (3)	279 (6)	360 (7)	425 (8)

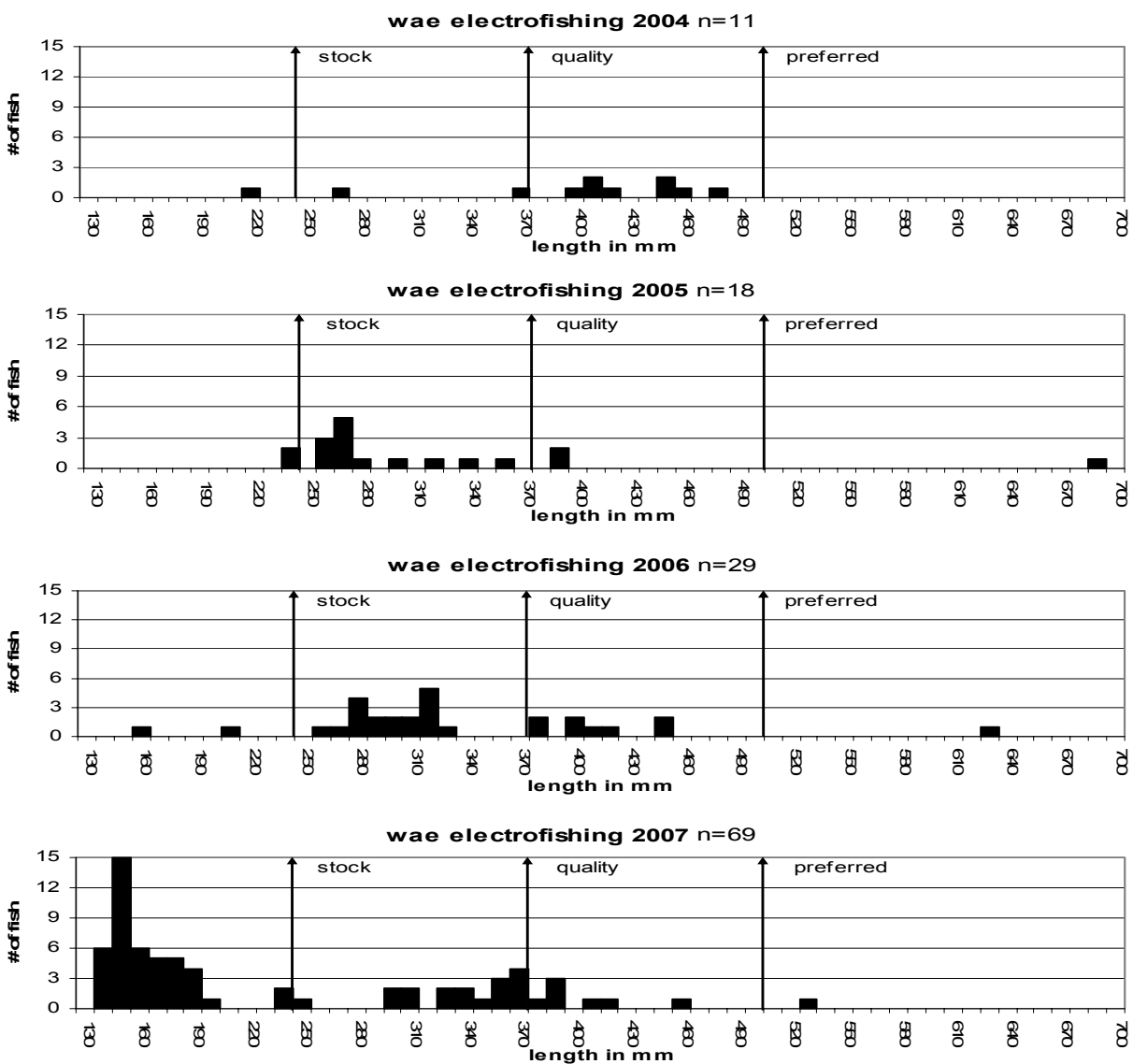


Figure 3. Lengths of walleye collected from fall electrofishing in Newell Lake, 2004-2007.

Yellow Perch

Adult yellow perch numbers remain low in Newell. During 2006, gillnet CPUE was 1.0, and trap net CPUE was 0.6, compared to 4.5 and 0.7 in 2004, respectively (Tables 11). In 2007, gillnets captured a good sample from the 2006 year class with 25.0 per net. Growth for the one year old perch was slightly over the state average (Table 12).

During ice-out in 2004, one hundred Christmas trees were placed in Newell Lake and again in 2006 another 100 were put in to provide yellow perch spawning habitat. Increased reproduction will hopefully provide forage for other game fish. In addition, it is hoped some of these fish recruit to the population and provide a better perch fishing opportunity. Hopefully, perch numbers will continue to increase.

Table 11. Composite listing of sample size (N), catch-per-unit-effort (CPUE with 80% CI's), for yellow perch collected by gill nets and frame nets in Newell Lake, 1999 - 2007.

Year	Gill net CPUE	Frame net CPUE
1999	3.6 (--)	2.2 (--)
2002	5.0 (3.1)	2.4 (1.5)
2004	4.5 (1.5)	0.7 (0.5)
2006	1.0 (3.1)	0.6 (0.6)
2007	25.0 (77.0)	0.1 (0.2)

Table 12. Newell Lake yellow perch age in 2006 from gillnets, sample size (N), mean back-calculated total length at age, mean SD length at age, and population standard errors (SE) (Willis et al. 2001).

Year Class	Age	N	1
2006	1	50	89
total		50	
2007 Mean (SE)			89 (0)
SD Mean (SE)			86 (2)

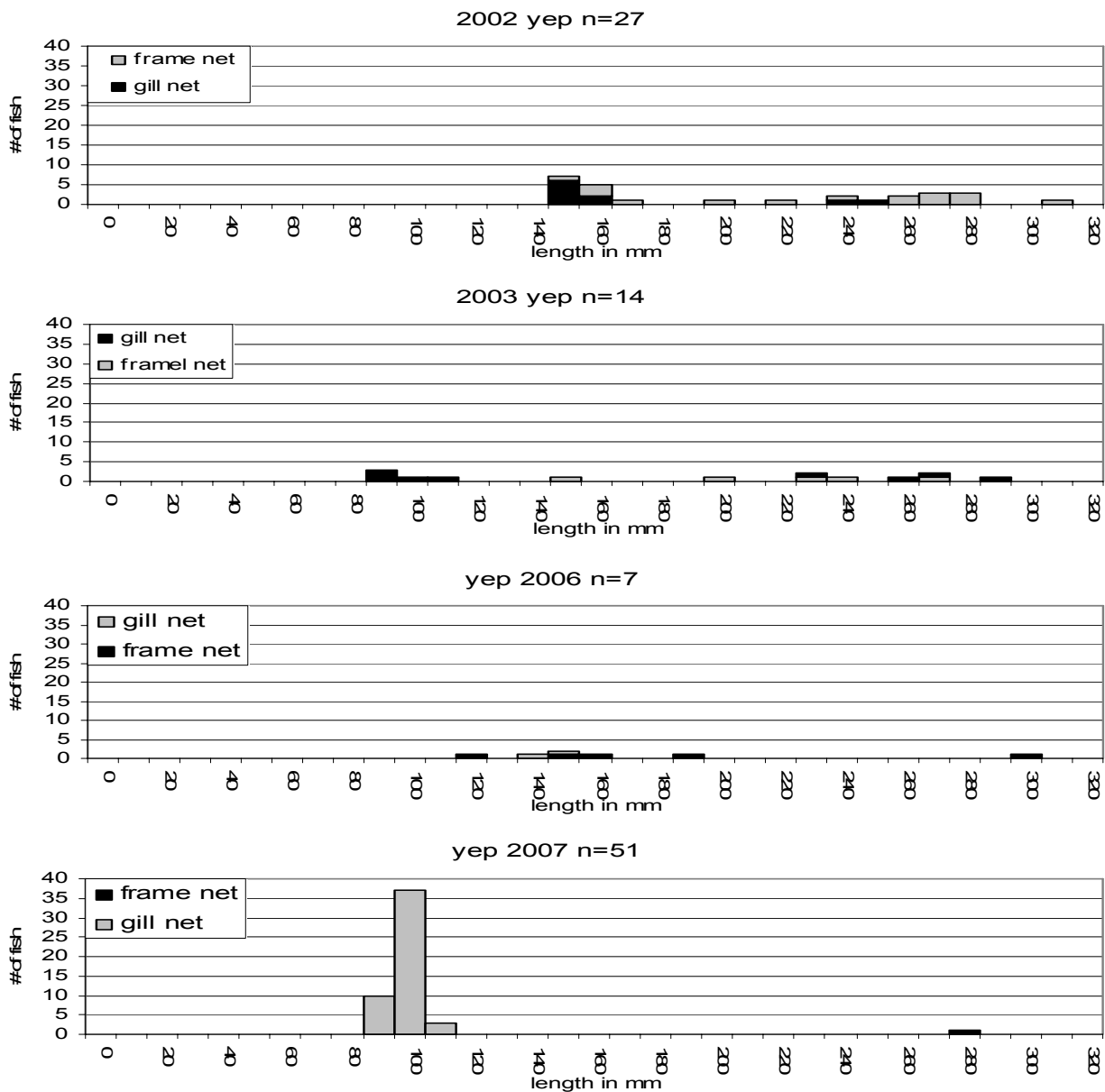


Figure 4. Length frequency histogram of yellow perch collected by frame nets and gill nets in Newell Dam 2002 - 2007.

LITERATURE CITED

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- Francis, J. 2000. WinFin Analysis Program. Version 1.5. Nebraska Game and Parks Commission, Lincoln.
- Willis, D.W., D.A. Isermann, M.J. Hubers, B.A. Johnson, W.H. Miller, T.R. St. Sauver, J.S. Sorenson, E.G. Unkenholz, and G.A. Wickstrom. 2001. Growth of South Dakota Fishes:

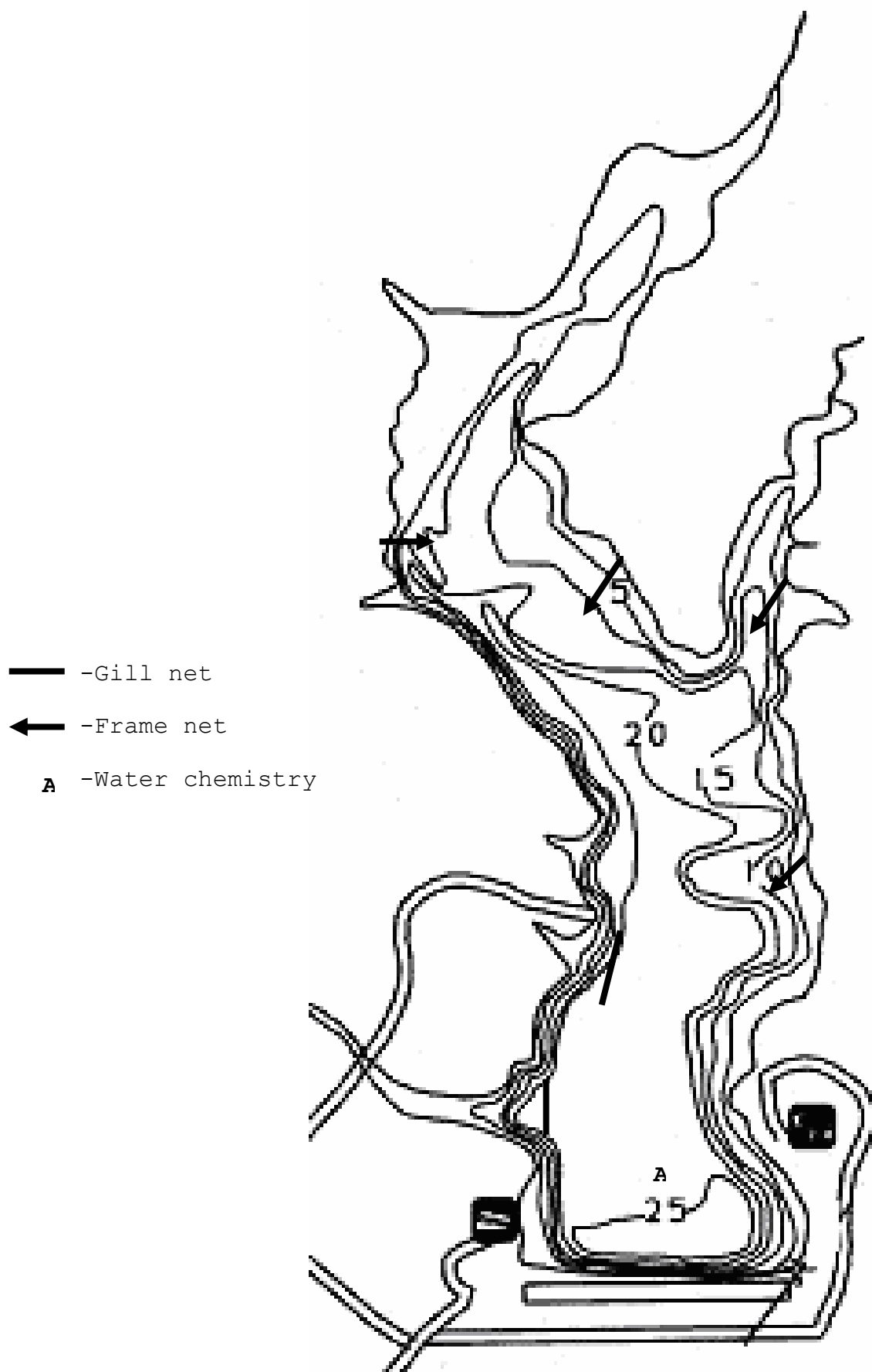
RECOMMENDATIONS

1. Conduct standard lake surveys at least once every three years to monitor fish populations.
2. Sample largemouth bass, smallmouth bass and walleye annually by night electrofishing to identify population changes and effectiveness of new regulations.
3. Stock advanced walleye fingerlings biannually at a rate of 10 walleye per acre as a secondary predator and bonus fishery.

APPENDICES

Appendix A. Stocking record for Newell Lake, Butte County, 1995-2007.

Year	Number	Species	Size
1995	20,000	Saugeye	Fingerling
1996	17,000	Largemouth bass	Fingerling
1997	4,200	Saugeye	Large fingerling
	18,400	Largemouth bass	Fingerling
1998	1,800	Saugeye	Advanced fingerling
2000	25,000	Saugeye	Fingerling
2001	100	Largemouth bass	Adult
2002	11,800	Largemouth bass	Fingerling
2003	1,120	Walleye	Large fingerling
2004	308	Walleye	Large fingerling
2005	2,230	Walleye	Large fingerling
2006	180	Largemouth bass	Adult
	187	Walleye	Large fingerling
2007	50,000	Walleye	Small fingerlings



Appendix C. Newell Lake net locations and water chemistry sites.